Relationship of Genera in *Nerieae (Apocynaceae)*

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Yogyakarta 1990

ABSTRACT

The three genera of tribe ***Nerieae*** *of* ***Apocynaceae,*** *namely* ***Beaumontia, Kibatalia,*** *and* ***Vallariopsis*** *are revised and the other genera of the same tribe are surveyed. The relationship of the genera within the tribe* ***Nerieae*** *are evaluated. Recent proposed arrangement of grouping of genera within the tribe* ***Nerieae*** *by Leeuwenberg (1988) is appended to this paper.*

I. INTRODUCTION

This article is written based on a result of almost 4 years research work which is done in Laboratory of Plant Taxonomy, Wageningen Agriculture University, The Netherlands.

The objective of the research work is to produce a revision of the Genera *Beaumontia, Kibatalia,* and *Vallariopsis (Apocynaceae),* in the form of a dissertation. Fortunately, the majority contents of the dissertation has been published by Wageningen Agriculture University The Netherlands in 1987 but only a small part of it due to some circumstances did not get opportunity to be published together with the taxonomic part of the dissertation within the same time.

It is a good chance, after long consideration, the author get an opportunity to publish it in this Bulletin of the Faculty of Forestry Gadjah Mada University.

Hopefully, by this way the scientific information implied in this article will be useful to readers and anybody else.

II. A HISTORICAL SURVEY OF GENERA IN *NERIEAE* AND THE RELATED TRIBE

The three genera *Beaumontia*, *Kibatalia*, and *Vallariopsis* all belong to the tribe *Nerieae* of the subfamily *Apocynoideae*, according to Pichon (1950) who gave the most recent survey of the family. The tribe was founded by Reichenbach (1837) who published one of the first efforts to subdivide the family of *Apocynaceae*. He included *Nerium*, *Strophanthus*, *Wrightia*, *Balfouria* (= *Wrightia*) and some other genera at present housed elsewhere. Independently, in the same year G. Don founded the tribe *Wrightieae* on *Wrightia* and *Kibatalia*, leaving *Nerium* and *Strophanthus* in the *Apocynoideae* (as *Echitoideae*). De Candolle (1844) more or less followed G. Don. Bentham and Hooker (1876) and also Schumann (1895) subdivided the *Apocynoideae* in another fashion. Pichon gave a historic survey of the subdivision of the *Apocynoideae* showing the great differences in the opinions of the above-mentioned authors. He himself coined yet another completly different subdivision of the *Apocynoideae*. He recognized 4 tribes, each subdivided in several subtribes. Although he indicated that he was in favour of basing taxa on a combination of characters he presented an unworkable artificial arrangement based almost exclusively on the way how the anthers cohere with the pistil head. However, the *Nerieae*, as he made it, seems to be the best founded tribe ot the *Apocynoideae*. The other three tribes appear very artificially circumscribed and several genera should change place (according to Leeuwenberg, pers.comm.).

III. METHODS, RESULT AND DISCUSSION

The present author could only compare data of the genera Pichon included in the *Nerieae* and a few genera of the other tribes. The *Nerieae* form a taxon quite reasonably based on a firm set of character states, and as it was not yet possible to compare the approximately 60 *Apocynoideae* genera placed by Pichon in the other tribes, *Nerieae* are mantained here with a few alterations.

At least Pichon's *Nerieae* are a much better taxon than any of the supragenetic taxa recognized in the *Apocynoideae* by Bentham and Hooker (1876),

Schumann (1895), and the three other tribes Pichon distinguished in this subfamily. The characters involved are the following.

Plants woody leaves usually opposite (not so in *Adenium*). Corolla frequently with a corona. Anthers narrowly triangular or nearly so, usually sterile at the apex and sagitate at the base, connivent into a cone and coherent with the pistil head. Pistil partly shed with the corolla (sometimes not in *Nerium*), in some genera the head or the upper part only, in other the whole part above the ovary. Fruits dry follicles, mostly apocarpous (syncarpous in *Nerium*, some *Wrightia* species and *Alafia multiflora*). Seeds with a terminal coma (not so in *Malouetia* and *Allowoodsonia*), sometimes also with a basal coma. Embryo with flat or folded cotyledons.

The recent revisions almost all on a monographic basis produced by several authors mentioned below substantially contribute to our knowledge of almost all genera Pichon classified in the *Nerieae*. After comparative studies of the obtained information, almost all genera he placed there are retained in the tribe:

Adenium (Plaizier, 1980), *Nerium* (Leeuwenberg, 1984), *Strophanthus* (Beentje, 1982), *Wrightia* (Ngan, 1965), *Pleioceras* and *Stephanostema* (Barink, 1983), *Beaumontia, Kibatalia* and *Vallariopsis* (Rudjiman, 1987), *Vallaris* (Rudjiman, 1982), *Malouetia* (Van der Ploeg, 1984, 1985), *Farguharia* and *Funtumia* (Zwetsloot, 1981), *Mascarenhasia* (Markgraf, 1976), *Alafia* (Pichon, 1954), *Isonema* (van der Ploeg, 1983), *Pottsia* (Tsiang & P.P. Li, 1977).

Only two of the genera Pichon placed in the *Nerieae* (*Deweurella* and *Amphineurrion*) should not remain there. As for these the opinion of Van der Ploeg is followed. *Deweurella* shows remarkable resemblances with *Parsonsia* in the flowers, especially by the well exserted stamens with long filaments and similar anthers. It is placed in the *Parsonsiinae* of the tribe *Echiteae*. *Amphineurion* was founded as a section of *Aganosma* by De Candolle (1844) and raised to the rank of genus by Pichon. The Present approach is to follow De Candolle in this respect.

Pichon's *Nerieae* are listed in Table 1 with the subtribes and genera he recognized and he placed here. Comments appear in the second column. Therefore only 16 genera of his list are maintained as such and at the same time kept in the *Nerieae*. The two genera *Allowoodsonia* and *Vallariopsis* not placed by Pichon could be placed in his *Malouetiinae* and *Kibataliinae* respectively. *Allowoodsonia* has flowers and seeds as *Malouetia* while the habit of the trees of both genera is also similar. These genera are the only two *Apocynoideae* genera lacking a coma on the seeds (Leeuwenberg, pers.comm.). *Vallariopsis* resembles

Kibatalia especially by the flowers. Moreover, according to Ridley (1923) *Vallariopsis* produces long slender fruits resembling those of *Kibatalia*.

The authors cited before, commented on the relationship of the genera they revised, and thus they created an arrangement in suprageneric taxa in the subfamily *Apocynoideae*. For the time being, also as the subfamily is too large to be easily overseen, the essentially maintained the *Nerieae* sensu Pichon. Beentje placed *Strophanthus*, *Nerium*, *Adenium*, *Wrightia*, and *Pleioceras* together. Plaizier showed the close relationship of *Adenium* with *Nerium* and he based his opinion on the resemblance of their inflorescences, corolla, appendages of the stamens and the fruits. Barink observed that *Wrightia*, *Pleioceras*, and *Stephanostema* are close relatives. Therefore she kept these 3 genera in the subtribe *Wrightiinae*. Van der Ploeg (1985) proposed to place together the genera *Malouetia*, *Allowoodsonia*, *Mascarenhasia*, *Kibatalia*, and *Funtumia* in one group, and *Strophanthus*, *Isonema*, and *Adenium* in another, basing his opinion mainly on the position and shape of flowers and the tree habit for the first group without proposing names for these groups.

IV. PROPOSED GROUPING OF THE *NERIEAE*

The present author compared the different genera again, and concluded that the *Nerieae* can be subdivided into 5 groups, for most of which he uses names already used earlier by Pichon for some of his subtribes. All subdivision made in the *Nerieae* are disputable. Moreover, the subdivision of the *Apocynoideae* is still a matter of concern and therefore it is considered better not to burden the present-day nomenclature with more names of ill-defined taxa at the level of sutribes. The *Nerieae* are a reasonably well defined tribe, but any subdivision leaves opened ends.

The 5 groups listed below, can be defended as natural units, thus putting some of Pichon's subtribes together and subdividing his *Neriinae*:

1. *Adenium* and *Nerium*. Both genera produce long twisted hairy appendages on the apices of the anthers. Their sepals are narrowly oblong or nearly so. Their showy corollas with mostly infudibuliform tube and rounded lobes are very similar. The aestivation of the corolla is to the right. Finally their stem anatomy cannot be greatly different, as *Adenium* can be grafted on a *Nerium*. *Adenium* has, however, minute scale-like corona lobes while the corona of *Nerium* consists of 5 large clearly lobed parts. The group could be named subtribe *Neriinae* as *Nerium* belongs to this subtribe.

2. *Wrightia, Pleioceras, Stephanostema, Beaumontia, Valarris* and *Strophanthus*. The first three genera share several character states: folded cotyledons, apex of the non-beaked seed (bearing the coma) directed towards the base of the follicle, the aestivation of the corolla to the left and conspicuous corona. The corona is absent only in *Wrightia religiosa*. *Strophanthus* resembles these three genera by the mostly infundibuliform corolla, but the cotyledons are flat, the apex of the beaked seeds is directed towards the apex of the follicle and the aestivation is to the right. Moreover the seeds bear not only a terminal coma, but also a deciduous basal one. *Beaumontia* and *Vallaris* resembles *Wrightia* by the often more or less similar corolla, frequently exserted stamens, non-beaked seeds with only an apical coma and flat cotyledons. However they lack the corona characteristic for almost all *Wrightia* species. The often very large infundibuliform white corolla of *Beaumontia* resembles the often colourful one of *Strophanthus*. Both genera have large usually more or less woody follicles and flat cotyledons. On the other hand *Beaumontia* lacks the corona characteristic for *Strophanthus* and has non-beaked seeds. The group could be called subtribe *Wrightiinae*.

3. *Kibatalia, Funtumia, Mascarenhasia, Malouetia, Allowoodsonia* and *Vallariopsis*. These 6 genera all have colleters on the inside of the sepals, coriaceous leaves and fleshy corollas the aestivation of which is to the right. The genera have no corona but possess long follicles. Furthermore the corolla tube is narrow and more or less cylindrical in most species. The five first genera have domatia on the leaves, the cotyledons are folded at least in *Kibatalia, Funtumia* and *Malouetia*, while at least both *Funtumia* species and some species of *Kibatalia* and *Malouetia* show the architectural model of Koriba. The group could be called subtribe *Kibataliinae*.

4. *Alafia* and *Farquharia*. The species in these two African genera are large lianas with coriaceous leaves, terminal inflorescences, fleshy corollas with a more or less cylindrical tube often inflated around the anthers with a usually flat limb, colleters in the calyx, and comate mostly non-beaked seeds. However, the seeds of *Alafia* have only an apical coma, but *Farquharia* seeds bear both an apical and a basal coma. The latter character was similar in *Adenium* of the first group. The comas of the seeds of both latter genera point away from the grain. The basal coma of the seeds of *Strophanthus* points towards the grain. The group could be called subtribe *Alafiinae*.

5. *Isonema* and *Pottsia*. These two genera are lianescent, bear terminal inflorescences and the flowers have corollas with a cylindrical tube. The stamens are well exserted, even the filaments are clearly visible above the corolla mouth and

the non-beaked seeds have at least an apical coma. *Isonema* also has a basal coma comparable with that of *Strophanthus*. These two genera were earlier classified in Pichon's *Neriinae*, but this group could be called subtribe *Pottsiinae*.

The following characters may support the propriety of the *Nerieae* as a good taxon, but subdivision nevertheless remains disputable. The follicles are syncarpous in *Nerium* and some *Wrightia* and *Alafia* species. The seeds of Nerium do not only bear a terminal coma, but also lateral hairs slightly resembling those of *Strophanthus bullenianus*. The seeds of *Strophanthus* are beaked as those of *Funtumia* and some *Alafia* species.

V. CONCLUSION

Taking into account the above mentioned considerations, the *Nerieae* are maintained as a tribe containing almost all genera assigned to it by Pichon, but for the time being its subdivision into subtribes remains disputable.

Nevertheless, in this research work the author managed to distinguish the *Nerieae* into more or less 5 natural groups i.e.:

(1) *Adenium* and *Nerium*.
(2) *Wrightia, Pleioceras, Stephanostema, Beaumontia, Vallaris* and *Strophanthus*.
(3) *Kibatalia, Funtumia, Mascarenhasia, Maloetia, Allowodsonia* and *Vallaris*.
(4) *Alafia* and *Farquharia*.
(5) *Isonema* and *Pottsia*.

Table 1. Arrangement of genera in Nerieae

Pichon (1950)	is at present:	Rudjiman (1990)
Nerieae		Nerieae
1. Neriinae (as Amphineuriinae)		1. Neriinae
Amphineurion	= Aganosma	Adenium
Pottsia		Nerium
Dewevrella	to Parsonsiinae	
Isonema		2. Wrightiinae
Nerium		Wrightia
		Pleioceras
2. Beaumontiinae		Beaumontia
Vallaris		Vallaris

Parabeaumontia = Vallaris
Muantum = Beaumontia
Beaumontia

3. Strophanthiinae
Christya = Strophanthus
Roupellina = Strophanthus
Strophanthus

4. Mascarenhasiinae
Mascarenhasia
Echitella = Mascarenhasia

5. Alafiinae
Alafia
Aladenia = Farquharia

6. Kibataliinae
Funtumia
Kibatalia

7. Wrightiinae
Wrightia
Wallida = Wrightia
Scleranthera = Wrightia
Pleioceras
Stephanostema

8. Malouetiinae
Malouetia
Malouetiella (Pichon 1954) = Malouetia

9. Adeniinae
Adenium

Vallariopsis not included
Allowoodsonia not mentioned

Strophantus

3. Kibataliinae
Kibatalia
Funtumia
Mascarenhasia
Malouetia
Allowoodsonia
Vallariopsis

4. Alafiinae
Alafia
Farquharia

5. Isoniinae
Isonema
Pottsia

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APPENDIX

The arrangement of genera within the tribe *Nerieae* proposed by Leeuwenberg (1988).

Nerieae

Adenium (5; Afr., Arab., Plaizier, 1980)
Nerium (1; Medit. to China; Leeuwenberg, 1984)
Strophanthus (38; Afr., As.; Beentje, 1982)
Wrightia (23; Afr., As.; Ngan, 1965)
Pleioceras (5; Afr.; Barink, 1983)
Stephanostema (1; Afr.; Barink, 1983)
Beaumontia (9; As.; Rudjiman, 1986)
Vallaris (3; As.; Rudjiman, 1982)
Vallariopsis (1; As.; Rudjiman, 1986)
Kibatalia (15; As.; Rudjiman, 1986)
Malouetia (ca. 15; Afr., S.Amer.; Van der Ploeg, 1984, 1985; Fallen, unpubl.)
Allowoodsonia (1; Pacif.; Fallen; unpubl.)
Funtumia (2; Afr.; Zwetsloot, 1981)
Mascarenhasia (ca. 10; Afr., mad.; Markgraf, 1976)
Farquharia (1; Afr.; Zwetsloot, 1981)
Alafia (ca. 25; Afr.; Mad.; Pichon, 1954)
Isonema (3; Afr.; Van der Ploeg, 1983)
Pottsia (3; As.; Tsiang & Li, 1977)